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ABSTRACT

The Cognitive Developmental Early Childhood program at Pennsylvania State University has formulated a program, curriculum, and evaluation system guided by Piagetian theory. The evaluation system described in this paper is a result of an intensive examination of the purposes and types of evaluation systems for their compatibility with the Piagetian assessment approach. The paper includes a brief description of the cognitive developmental program, the design and implementation of the evaluation system, and the types of information generated by the system and their utilization in the program. A hierarchy of developmental levels was derived from Piagetian theory and research, and these levels were used to guide the teacher in both activity presentation and formative data collection. The computer-based evaluation system provided a mechanism of continuing feedback, and suggests a means for a more systematic and intensive study of the formation of cognitive operations in children. The system is expected to be of particular use in a careful study of such phenomena as transitional periods and/or horizontal decalage (eg. the effect of intervention programs on different cognitive operations during transitional periods.) The proposed evaluation system is believed to offer a significant contribution to Piagetian methodology and research and application of the theory in a variety of intervention contexts. (CS)

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FORMATIVE EVALUATION IN A COGNITIVE DEVELOPMENTAL PROGRAM FOR YOUNG CHILDREN[1]

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Methods of assessing a child's level of cognitive development have been a topic of perennial concern in Piagetian studies. Most frequently discussions (Phillips, 1969) have focused on the differences between psychometric measurement and Piaget's clinical approach and the [illegible]s and difficulties associated with each method. The Piagetian approach to assessment has been characterized, first, by a concern for levels of development which are defined according to theoretically consistent stages, rather than by statistical derivation of levels of performance common to the psychometric approach. Piagetian tasks are developed to reflect the quality of thought dominant at a given developmental stage in the theory.

Secondly, Piagetian assessment procedures typically lack the structure or standardization characteristic of the psychometric approach. Since Piagetian assessment is designed to study the underlying cognitive processes, flexibility in the sequence of questioning is desirable in order to accurately ascertain the qualitative level of a child's thinking. The child's responses, in this regard, are analyzed in terms of the cognitive processes defined by the theory as being necessary to generate a given response; and, therefore, are not analyzed simply as right or wrong answers. Indeed, wrong responses may provide a clearer picture of the child's reasoning processes than correct ones. The succeeding question is determined by the subject's response to preceding questions. Thus, the child's answer provides feedback to the assessor which should then be used in phrasing the next problem.

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Thirdly, Piaget's early writings suggest an assessment procedure involving a detailed systematic study of individual children (viz. his study of his own children) with observations made at frequent intervals and extending over a longer period of time (e.g. sensory motor period). The emphasis here is on assessment of frequent intervals extending over a major developmental period. It seems that such an approach resulted in a more careful delineation of developmental levels or stages which is lacking in his later writings concerning the pre-operational and concrete operational periods. Thus, an accurate assessment of a child's developmental level is hampered by an incomplete picture of the substages involved in the development of a cognitive process or operation. Wohlwill (1963) points out that the Piagetian sequence of stages often lacks a sufficiently large number of definable steps needed for the application of a scalogram analysis. As a specific example, Kamii (1971) noted the need for a more detailed statement of the sequential development of spatial vs. temporal correspondence in the development of one-to-one correspondence or numerical equivalence.

Evaluation Systems

In the development of the Cognitive Developmental Early Childhood program it was felt that not only should the program and curriculum be guided by Piagetian theory but also that the evaluation system for the program should be compatible with the theory. Thus both the purpose and the types of evaluation systems were examined for their consistency with the Piagetian assessment approach. The evaluation system described in this paper is a result of that examination.

According to Bloom et al. (1971) the purpose of evaluation should involve providing the information necessary for the planning, development and execution of an educational system to improve and/or optimize learning and teaching.[2] This view (Bloom et al., 1971) suggests that evaluation should consist of the

following: 1) a method of acquiring and processing information needed to improve the teaching and the student's learning, 2) an aid in clarifying the goals of education and as a process for determining the extent to which students are developing in these desired ways, 3) a system of quality control in which it may be determined at each step in the teaching-learning process whether the process is effective or not, and if not, what changes must be made to ensure its effectiveness, 4) a tool for ascertaining whether alternative procedures are equally effective or not in achieving a set of goals.

Evaluation systems may be categorized into 3 major types: diagnostic, summative, and formative. One means of differentiating between the 3 types is in terms of when the evaluation occurs. Diagnostic evaluation is primarily conducted prior to the onset of instruction and provides information on the student's entry level of performance. Formative evaluation involves a continual process of assessment during the learning period, while summative evaluation is typically conducted less frequently than formative evaluation and is often done at the end of a large unit of instruction.

Formative Evaluation

Formative evaluation is concerned with determining at each step in the teaching-learning process whether the process is effective or not and, if not, what changes must be made to ensure its effectiveness. Because of its continual and systematic nature of assessment, formative evaluation is frequently concerned with delineating the step-by-step sequence in the developmental or learning process, rather than assessing the child's performance on a fully learned or developed skill or ability with little concern for the underlying steps. This concern for the stages in learning or development has led formative evaluators (Bloom et al.,1971) to suggest that a study of the student's pattern of errors may be not only a means of accurately assessing his present level of performance but also have implications for what instructional procedures

would be most effective for dealing with these error patterns. An important role of formative evaluation, then, is its use as a feedback mechanism. The frequent assessment process is continually providing information on student progress and instructional methods which are fed back to the program personnel and are used to determine what is the next question or instructional format which should be used to improve or optimize the student's learning given his present level of development. Thus, the interaction between teacher and child is constantly being assessed and redirected in terms of the child's previous responses.

Summative Evaluation

In contrast to formative evaluation, summative evaluation involves less frequent assessment periods and is concerned with major aspects of program progress. Summative evaluation is not concerned with assessment of the step-by-step learning process but is directed toward cumulative products of the learning process. In addition, summative evaluation may be used to determine whether the program is having an effect greater in magnitude than the effects of other programs or in comparison with previous years. Usually this sort of evaluation results in a finalized set of reports - e.g. yearly reports of student progress or program effectiveness

Compatibility of Piagetian Assessment and Formative Evaluation

In consideration of the above discussion, it would seem that while the total evaluation system for the Cognitive Developmental program should include a summative component, the major focus should be on assessment of a formative nature.[3] The compatibility between Piagetian methodology and formative evaluation may be summarized as follows: In both systems there is a concern for assessment of the child's progress at each step or stage in the learning or developmental progress. Hierarchies of substages or phases in learning or development are formulated in both Piagetian studies and formative

evaluation and are used to guide the assessment process. However, a detailed delineation of each step in the developmental hierarchy seems especially necessary in formative evaluation. This need for a careful specification of hierarchical levels is due to the fact that the steps in formative evaluation are based on a hierarchy of goals, operationally defined by curriculum/instructional components. While the need for a large number of definable steps in a Piagetian sequence of stages has been noted in descriptive Piagetian research (Wohlwill, 1963), this deficit becomes even more crucial in planning curricular sequences. Gaps in knowledge concerning the hierarchy of learning/development result in gaps in sequencing of curricular activities according to a developmental hierarchy. Curricular planning and implementation occurs on a continual, day-to-day basis and thus requires a more carefully defined developmental learning hierarchy than may be required for testing. Moreover, in both Piagetian and formative assessment systems the utility of error patterns is noted in determining the child's level of development and learning and in determining appropriate questioning or curricular sequences.

Secondly, since each stage in the learning process is important, assessment is conducted at frequent intervals or on a continual basis. Such continual assessment is important in determining and validating invariant sequences in learning or developmental hierarchies.

Third, both assessment systems have a cyclic or feedback mechanism. The child's response provides information to the tester or teacher which guides selection of the next question or task to be introduced. Thus, the child is continually feeding information into the program or testing situations which redefines the direction of the tester or instructional format. While the tester need be concerned with evaluating the developmental level reflected by one child's responses, the teacher in a preschool classroom is required to continually monitor the responses of 20-25 children and to redirect the program accordingly. It would be impossible for a teacher to "keep in mind" the exact level of

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responses for each of 20-25 children on each of several curriculum components and to plan daily activities accordingly. Therefore, the need for a planned evaluation system within the program becomes evident in order to utilize this large amount of information. Program planning and implementation is optimized when data is summarized into specific types of information which have been indicated by program personnel to be useful in planning and/or decision making processes.

Actually, the assessment system is much more complex than the picture just presented. For example, in many programs the child is interacting with several teachers and with different materials and instructional formats. Variations in the child's exact level of responding may be attributable to differences in teachers or materials. To provide a truly accurate profile of the child's developmental level within the context of the program, his responses should be analyzed in the light of teacher and curriculum effects. The collection and utilization of such information in program planning will be discussed more fully in sections of this paper on teacher information and programmatic variables.

Development of a Formative Evaluation System

The development of a formative evaluation system for the Cognitive Developmental Early Childhood program was begun in the Fall of 1973. While the evaluation system is still in an early developmental stage, its utility has already become evident. The following discussion will include: a brief description of the cognitive developmental program, the design and implementation of the evaluation system, and the types of information generated by the system and their utilization in the program.

Cognitive Developmental Early Childhood Program

Personnel. The Cognitive Developmental program with a focus on Piaget's theory is one of three model early childhood education programs established within the Laboratory of Early Childhood Education, Division of Individual and Family Studies, College of Human Development, at The Pennsylvania State University. The programs are in operation in the morning Tuesday through Friday with Monday devoted to program planning and development. Each program serves a maximum of 25 children (aged 3-5 years), drawn from university, community, and disadvantaged populations in the area. The program is staffed by 2 graduate students in the Division of Individual and Family Studies who serve as head and assistant teachers and by 4-8 undergraduate student teachers. A faculty member in the division serves as consultant to the program. While the consultant, head and assistant teachers are stable staff members throughout the year, the student teachers rotate from term to term. The head and assistant teachers are engaged in masters and doctoral level studies in early childhood education and/or child development. Typically, a graduate student is associated with the program for two years, progressing from assistant teacher the first year to head teacher the second year. Thus, program consistency and development is facilitated by staff stability.

Curriculum. Three major goal areas (cognitive, social-emotional and psychomotor) provide direction for development of the curriculum for the children. While activities defined for each goal area are reflective of Piagetian theory, the cognitive area is most closely derived from the theory (see Willis, 1973; Willis & Clement, 1973) and has received major emphasis in program and curriculum development. Within each goal area there are several curriculum components which suggest the types of activities to include in a goal area. Curriculum components within the cognitive area include: Classification, Seriation, Number Concepts, Physical Knowledge and Social Knowledge. The

latter two areas have been suggested by Kamii (1971) as extensions to the theoretical framework. Within each curriculum component for the cognitive area (e.g. Classification) a hierarchy of developmental levels derived from theory and research has been developed and is under continual revision as new information is available.

Each of the 3 goal areas receive particular focus at specific activity periods within the daily schedule (e.g. The psychomotor area receiving emphasis during outdoor play). However, just as Piaget perceives all aspects of development occuring in an integrated manner, a particular classroom activity may also incorporate several goal areas. Two activity periods in the daily schedule are most heavily oriented toward cognitive activities. A large number of activities for each curriculum component (and for specific developmental levels within a curriculum component) are continually being generated by the head and assistant teachers and by the student teachers.

Activity Format

Within most activity periods in the daily schedule there is a choice of several activities; the child is free to choose to participate in any or all of the activities within an activity period. Activities are presented in a problem and/or game format; and several children usually are participating in an activity at one time. Instead of showing or telling a child how something works or how to deal with a situation, the child is encouraged to manipulate materials and use past experience to discover new ways to meet new situations. The principal function of the teacher is that of catalyst. She provides the child with materials, poses the problem, watches, asks questions, and shares the enthusiasm of the child. She tries to help the child crystalize and extend his own ideas with questions such as: "Why did you do that?"; "How did you decide to put these in one group and those in another?"; "Can you do it another way?" The teacher's further questioning or posing of problems is based on the child's responses.

Design of the Formative Evaluation System

Since 1973-74 is the first year for development of the formative evaluation system, it has been implemented in only one goal area. Since the cognitive domain receives the heaviest emphasis within the program and is most closely associated with Piagetian theory, it has been the goal area chosen for initial evaluation. It is anticipated that the evaluation system will be extended to other program components in subsequent years.

The cognitive goal area is divided into the curriculum components of: Classification, Seriation, Number Concepts, Physical Knowledge and Social Knowledge. For each of these curriculum components a hierarchy of developmental levels has been derived from Piagetian theory and research. These levels are used to guide the teacher in both activity presentation and formative data collection. The teacher asks questions or poses problems related to lower levels of the hierarchy and records the child's response before proceeding to higher levels.

For each curriculum component (e.g. Classification) a formative data card has been developed for recording a child's responses.

Figure 1

A data card is used to collect data on each activity taught within a given curriculum component. The sample data card shown in Figure 1 is for a classification activity. Names of all children participating in the activity are listed on the card. Name of the curriculum component (e.g. Classification), title of activity (e.g. Balloons), name of teacher (e.g. Vickie) and date are listed. The hierarchy of developmental levels defined for the curriculum component is listed across the top of the card. The levels and sequencing of levels is subject to adaptation as further information is gained concerning developmental hierarchies from this and other research. The teacher indicates with checks

minuses each level of the hierarchy attempted and/or attained by each child during an activity. Additional comments noted about the child's responses aid in assessing his level of thinking: this information is entered in the column entitled "Comments." The numbers placed by children's names, curriculum components, titles of activities, etc. serve as codes for computer storage and retrieval of the data.

Presently, these types of data re collected during the two activity periods in the daily schedule, emphasizing cognitive curriculum components. Since children have a choice in which activities they participate, the number and type of activities on which data are collected will vary slightly from child to child.

Instructional manuals which specify the procedures for collecting data are developed for each curriculum component (e.g. classification). Each level of a particular curriculum component's hierarchy of developmental levels has been operationalized and examples given of typical responses children may give at each developmental level. These instructional manuals are used in defining data collection procedures which yield valid and reliable data.

The head, assistant and student teachers present the activities and collect the data; they participate in an intensive workshop on Piagetian theory and data collection at the beginning of their practium experience. Throughout their participation in the program these teachers are given further instruction and monitoring on procedures for data collection. As will be described later, the evaluation system provides indirect information on teacher performance.

Feedback Mechanism in the Formative Evaluation System

The prupose of the formative evaluation system is to monitor and provide information on the child's level of development as indicated by his responses to program activities and to use such information in determining further program planning and staff training. The total feedback process is illustrated in

Figure 2. The child's responses are continually being fed into the system and are used in determining when certain activities/questions are appropriate and should be presented.

Figure 2

The teacher presents an activity to the child. The child responds to the activity, and his level of development as indicated by his responses is recorded on the formative evaluation data card.

The information on the data card (i.e. child's name, date, teacher name, curriculum component, activity title, hierarchical developmental level within the curriculum component, instructional format) are coded numerically for storage in the computer system. Each child, teacher, curriculum component activity, title, etc. has an ID number to facilitate retrieval of information from the system.

The data (indicated above) concerning each child's responses in a given activity are punched on a computer data card. These data (i.e. each child's response to each activity participated in during a given week) are fed into the computer system on a weekly basis.

The program evaluator is responsible for development of the mechanisms necessary to code and process data in the computer-based system. The program evaluator works closely with the program staff in determining the types of information to be generated by the evaluation system, in statistical analysis of the data, and in the decision making process of how to utilize the information in assessing and redirecting the program activities.

Presently the evaluation system has the capability of generating a series of computer print-outs or reports which provide data on the performance of each child and teacher for each curriculum component being evaluated. The types of output or data generated may be classified into 3 main areas: 1) Performance data on each child, 2) Performance data on each teacher across all children

taught by her and 3) Programmatic data concerning differential performance of children as a function of types of materials, instructioanl formats, etc. Each of these types of data output are discussed briefly in a later portion of the paper.

It should be noted that the evaluation system has the capacity to generate output at any of a variety of assessment intervals (daily, weekly, bi-weekly, monthly, etc.) Presently, child and teacher data are presented for two assessment intervals (weekly and cumulative across the year). While the utility of assessment intervals of different lengths of time is just now being explored, it is conceivable that different types of data may provide optimal feedback into the system if cumulated and included in program planning at different interval periods. For example, teacher data should be reported on a weekly basis to monitor teacher performance and assure accurate data collection. In contrast, the relative effectiveness of two different instructional formats may become evident only when cumulative data for an entire term (9 weeks) is presented.

Each of the three types of data outputs (child, teacher, programmatic) listed above are used by the program evaluator and program staff (consultant, head and assistant teachers) in making decisions concerning further program planning and staff development. The student teacher is given information concerning her performance as indicated by the response levels of children she taught. These data are used in providing further staff training and in directing her performance during future activity presentations.

Data Output Formats

Each Monday during program planning and staff training sessions computer print outs are available for summarizing program activities for the preceding week. Data can be summarized in terms of child information, teacher information, programmatic information.

A. Child Information

There is a print out concerning child performance in relation to each curriculum component under evaluation. Thus, there are 5 print outs, one each for Classification, Seriation, Number Concepts, Physical Knowledge and Social Knowledge.

Figure 3

Figure 3 presents a hypothetical summary of children's performance on classification activities for a given week in a specific term (e.g. Week 12 which is in the second term of the academic year). Children's names are printed at the left-hand margin. The numbers (1-10) across the top of the sheet correspond to the hierarchy of developmental levels for classification listed on the formative data card. Information is presented by week (the left-hand portion of the print out) and cumulatively by term (extreme right-hand portion):

Child Information by Week:

1. For each level of the hierarchy for a given curriculum component, the relative frequency (successes/attempts) of a child's performance is indicated. For example, Amy Sue attempted to do additional classification (level #4 in hierarchy) one time during classification activities and was successful 1 out of 1 times e.g. (1/1). However, she attempted level #5 one time and was unsuccessful (0/1).
2. The highest level of the classification hierarchy which was attained for 75% of the attempts made by the child for that hierarchical level is indicated by the column headed FOR PAST WEEK: MAX CAT AND AVE REL FREQ. For example, the highest level of the hierarchy attained by Amy Sue according to the criterion specified above was 4.

3. The number of activities within a given curriculum component, which the child participated in during a week is indicated under the column entitled FOR PAST WEEK: NO. LESS. TRIED. For example, Amy Sue participated in 4 classification activities during the particular week indicated on the sample print out.

Child Information - Cumulative

Information is cumulated progressively across weeks and across terms of a given academic year.

1. The cumulative average level of the classification hierarchy which was attained for 75% of the attempts made by the child is indicated in the column FOR TERM: AVE CAT ATMT. For example, Amy Sue's average level of responding as indicated by averaging her level of performance across all preceding weeks in the academic year is 3.8.
2. The average number of lessons per week in which a child has participated thus far in the academic year is indicated in the column FOR THE TERM: AVE LESS TRIED. This cumulative information is comparable to #3 under weekly information.

Class averages are presented in the bottom right-hand portion of the print out.

B. Teacher Information.. Information concerning student teacher performance is also available on a weekly and cumulative basis. Student teacher performance is obtained from the performance of the children she taught. This data is computed by averaging across children the highest hierarchical level of responding attained by each child who participated in activities within a given curriculum component under that teacher's direction. It is felt that a teacher performance score derived from such an averaging of children's performance has some utility since due to the freedom of choosing activities, any or all children could be taught by a teacher. A given teacher's score may be compared to the scores of

other teachers or to the class average score for a particular curriculum component. Comparing these scores across teachers in this raw score form is done since preferences by certain children for certain teachers has not been observed. Figures 4-6 present hypothetical teacher information summaries. Names of teachers are listed at the left hand margin; each of the 5 columns on the right list the teacher performance scores for a given curriculum component. (e.g. "Clas" indicates the curriculum component of Classification)

Teacher Information by Week

1. The average optimal level of attainment achieved by all children under the teacher's direction is listed for each teacher for each curriculum component. For example, for the calssification activities directed by Brenda during a given week the children participating achieved an average optimal level of 4.6.

Figure 4

Teacher Information - Cumulative

1. The cumulative average optimal level of attainment achieved by all children under the teacher's direction is listed for each teacher for each curriculum component in Figure 5. This provides a rather stable estimate of the teacher's performance in that component for the total length of time she has taught in the program. As with child information, "cumulative" indicates averaging across all preceding weeks in the academic year.

Figure 5

2. A cumulative frequency count of the number of activities a teacher has prsented in each of the curriculum components is presented in Figure 6.

This provides an indication of the amount of data which have cumulated to form a teacher's performance score. Such data can be used for scheduling a student teacher's participation in each curriculum component to assure her having sufficient experience in each component.

Figure 6

C. Programmatic Information

A study of children's responses in relation to certain curriculum or instructional variables is now in the planning stages. Initially, study will focus on variation in child's level of responding within a curriculum component which may be attributable to different characteristics of materials (e.g. dimensionality, number, visual cues, tactile cues, etc.) The research of Piaget (1964) and Elkind (1964) suggests that horizontal decalages in the child's responding within a cognitive operation, such as classification, may be due to variables in the materials. Likewise, the relative influence, if any, of various activity presentation formats (e.g. questioning vs. modeling format) on the child's level of responding within a curriculum component is presently being studied.

Decision Making and Information Utilization in the Formative Evaluation System

The formative evaluation system would seem to have significant potential in the following areas: 1) monitoring of match between child's level of responding and program activities. By a continual assessing of the child's participation in activities and his level of responding, activities can be planned to optimize his functioning in the program. For example, the column indicating the number of activities within each curriculum component in which a child participated can give the teacher information concerning the distributuion of activities participated in. One, or more children's continued avoidance of a curriculum component might suggest that the tasks are not being posed on their

developmental level or the interest level in the activity is low suggesting a need for revision of curriculum materials. Combining several bits of information (child's weekly vs. cumulative level of responding plus the number of activities participated in) can suggest to the teacher which alternative approaches would be most appropriate. 2) Curriculum development and evaluation. The relative difficulty level or average level of attainment for a particular curriculum component or for specific activities within a curriculum component is easily calculated. Such an evaluation system may be used to help develop a spiraling curriculum with various levels of activities within each curriculum component corresponding to hierarchical development levels. As mentioned previously, curriculum activities can be assessed for the effects of material variables as well as the effectiveness of various instructional formats. Program and curriculum modifications can be made with greater accuracy due to the specificity and frequency of the data input. 3) Staff development and training. Staff members receive detailed and frequent feedback concerning their effectiveness in presenting cognitive activities and their accuracy in recording data on children's performance. For example, an examination of the student teacher's average optimal level of performance can reveal if her averages are compatible with those of the head and assistant teachers as well as with other student teachers or with class averages. A comparison of a teacher's weekly vs. cumulative average would indicate whether her scoring is consistently higher or lower than other teachers across children. An examination of the number of times a teacher has presented activities within a curriculum component would suggest whether scoring difficulties are due to inexperience with the topic. The cumulative frequency of activity presentations within each curriculum component can be used regularly by the supervisory staff to see that student teachers receive sufficient experience in each type of curriculum component. 4) Basic research on cognitive development

in young children. This evaluation system suggests a means for a more systematic and intensive study of the formation of cognitive operations in children. Such a system should be particularly useful in a careful study of such phenomena as transitional periods and/or horizontal decalage (e.g. the effect of intervention programs on different cognitive operation during transitional periods). Moreover, the continual and extensive accumulation of data across the development of several cognitive operations offers the possibility for studying the interdependency between various levels of different cognitive operations.

In summary, such an evaluation system is believed to offer a significant contribution to Piagetian methodology and research and application of the theory in a variety of intervention contexts.

FOOTNOTES

[1]Appreciation is expressed to Dr. Donald L. Peters for his substantial contribution to the development of the evaluation system and his critical reading and comments on earlier drafts of this paper.

[2]We use Phillips' (1969) definition of teaching in this context - "Teaching is the manipulation of the student's environment in such a way that his activities will contribute to his development (toward goals whose definitions are not our present concern)." (Phillips, 1969, pp. 108-109). While Phillips declines to define the goals and objectives for the cognitive developmental program to be discussed are derived from Piagetian theory and are expressed in terms of cognitive processes and operations appropriate for the preoperational child. Thus, evaluation is directed and conducted in terms of the goals and objectives specified by the program.

[3]Kamii (1971) is the only Piagetian researcher to the authors' knowledge who has considered formative evaluation with respect to Piagetian assessment. While her comments concerning formative evaluation are relatively brief, their utility as a stimulus in contributing to the development of the present formative evaluation system is acknowledged.

Figure 1

Sample Formative Data Card

07 Date Tues, Nov. 6 02 Lesson: Classification 01 Title: Balloons Child's Name	Non-Participant	Attempts to Classify	Classifies	Classifies Verbal Rationale	Additional Classification	Additional Classification Verbal Rationale	Multiple Classification	Multiple Classification/ Verbal Rationale	Matrix	Matrix and Rationale	Teacher: Snyder 05 Comments
20 Kara			X	X							
23 Melanie			X	X							
25 Jennifer			X								
10 Andrew	X										Came to watch
09 Stephen		X									Moves from one criterion to another before including all.

FORMATIVE EVALUATION FEEDBACK SYSTEM IN COGNITIVE-DEVELOPMENTAL PROGRAM

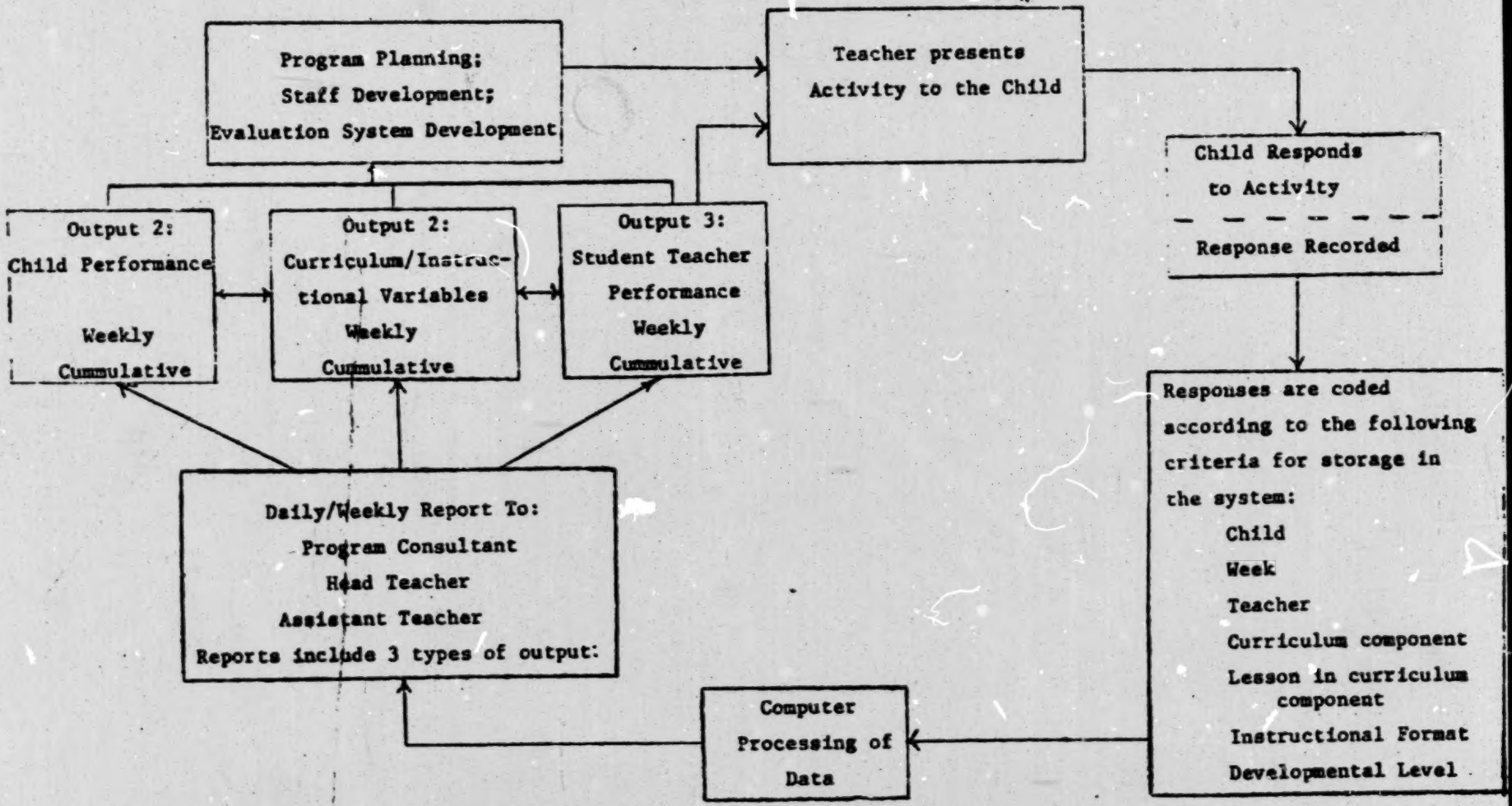

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Figure 3

CUMULATIVE SUMMARY BY TOPIC FOR EACH STUDENT UP TO END OF WEEK 12 OF TERM 2 73/74

CUMULATIVE SUMMARY FOR TOPIC CLASSIFICATION (10 CATEGORIES)

NAME OF STUDENT	********** CATEGORY FREQUENCIES FOR PAST WEEK ONLY ********** 1	2	3	4	5	6	7	8	9	10	FOR PAST WEEK MAX CAT AND AVE FREQ	NO. LESS TRIED	FOR TERM AVE CAT ATMT	AVE LESS TRIED
TINA	0/ 0	0/ 0	0/ 0	0/ 0	0/ 0	0/ 0	0/ 0	0/ 0	0/ 0	0/ 0	0/0.00	0	0.0	0.00
DAVID	1/ 1	4/ 4	4/ 4	5/ 5	3/ 4	2/ 2	0/ 0	0/ 0	0/ 0	0/ 0	6/0.95	5	4.0	1.08
PETER	0/ 0	1/ 1	1/ 1	1/ 1	1/ 1	0/ 0	0/ 0	0/ 0	0/ 0	0/ 0	5/1.00	1	3.9	0.42
ANDERS	1/ 1	3/ 3	3/ 5	2/ 3	0/ 1	0/ 0	0/ 0	0/ 0	0/ 0	0/ 0	2/0.69	5	4.7	0.83
MICHAEL	1/ 1	2/ 2	1/ 2	1/ 1	1/ 1	0/ 1	1/ 1	1/ 1	0/ 0	0/ 0	8/0.80	2	5.3	1.08
ROBERT	2/ 2	2/ 3	2/ 2	1/ 1	1/ 1	0/ 0	0/ 0	0/ 0	0/ 0	0/ 0	5/0.89	3	4.3	1.00
PAUL	1/ 1	2/ 2	3/ 4	2/ 4	0/ 0	0/ 0	0/ 0	0/ 0	0/ 0	0/ 0	2/0.73	4	2.2	1.33
ERNEST	0/ 0	3/ 3	4/ 4	5/ 5	2/ 3	1/ 1	0/ 0	1/ 1	0/ 0	0/ 0	8/0.94	5	5.1	1.25
STEPHEN	1/ 1	3/ 3	4/ 4	1/ 3	1/ 2	1/ 2	1/ 1	0/ 1	0/ 0	0/ 0	7/0.71	4	5.1	0.92
ANDREW	0/ 0	1/ 1	2/ 3	2/ 3	1/ 1	1/ 1	0/ 0	0/ 0	0/ 0	0/ 0	6/0.78	3	5.5	1.25
RICHARD	0/ 0	2/ 2	5/ 5	4/ 5	0/ 2	0/ 0	0/ 0	0/ 0	0/ 0	0/ 0	3/0.79	5	4.2	1.25
RICHARD	1/ 1	4/ 4	3/ 4	3/ 3	1/ 1	1/ 1	0/ 0	1/ 1	0/ 0	0/ 0	8/0.93	4	5.3	1.58
ALEXANDER	0/ 0	1/ 1	2/ 3	2/ 2	1/ 2	0/ 0	0/ 0	0/ 0	0/ 0	0/ 0	4/0.75	3	4.6	0.83
AMY SUE	0/ 0	4/ 4	2/ 2	1/ 1	0/ 1	0/ 0	0/ 0	0/ 0	0/ 0	0/ 0	4/0.88	4	3.8	1.25
TERRY	0/ 0	2/ 2	6/ 7	4/ 6	4/ 5	1/ 3	1/ 1	0/ 1	0/ 0	0/ 0	7/0.72	7	3.6	1.42
PAULI	2/ 2	2/ 2	1/ 1	1/ 1	0/ 0	0/ 0	0/ 0	0/ 0	0/ 0	0/ 0	4/1.00	2	2.8	0.42
MARY	0/ 0	1/ 1	1/ 1	1/ 1	0/ 0	0/ 0	0/ 0	0/ 0	0/ 0	0/ 0	4/1.00	1	5.1	0.50
PIM	4/ 4	2/ 2	1/ 2	0/ 1	0/ 0	0/ 0	0/ 0	0/ 0	0/ 0	0/ 0	2/0.78	4	2.8	0.92
SUSAN	3/ 3	2/ 2	2/ 2	2/ 2	0/ 0	1/ 1	0/ 0	1/ 1	0/ 0	0/ 0	8/1.00	3	4.6	1.17
KARA	0/ 0	1/ 1	2/ 2	3/ 3	1/ 1	1/ 1	0/ 0	0/ 0	0/ 0	0/ 0	6/1.00	3	4.9	1.08
DROPPED	1/ 1	2/ 2	2/ 2	2/ 2	0/ 0	0/ 0	0/ 0	0/ 0	0/ 0	0/ 0	4/1.00	2	3.1	0.92
ANDREA	1/ 1	0/ 0	1/ 1	1/ 1	0/ 1	0/ 0	0/ 0	0/ 0	0/ 0	0/ 0	4/0.75	1	2.6	0.75
MELANIE ANNE	0/ 0	2/ 2	5/ 5	5/ 5	2/ 2	1/ 1	0/ 0	1/ 1	0/ 0	0/ 0	8/1.00	5	4.7	1.42
DROPPED	0/ 0	0/ 0	2/ 2	2/ 2	2/ 2	2/ 2	1/ 1	1/ 1	0/ 0	0/ 0	8/1.00	2	5.3	0.92
JENNIFER	0/ 0	2/ 2	3/ 3	5/ 6	3/ 3	3/ 3	0/ 0	0/ 0	0/ 0	0/ 0	6/0.94	6	5.5	1.25
										CLASS AVERAGES	5.4/0.84	3.5	4.1	1.03

Figure 4

SUMMARY OF AVERAGE CATEGORY ATTAINMENT
IN TOPICS TAUGHT BY EACH TEACHER

FOR WEEK 12 OF TERM 2 73/74

********** TOPIC AVERAGES **********

NAME OF TEACHER	SCCI	CLAS	SERI	NUMB	PHYS
VICKIE	0.00	4.36	6.25	3.00	3.50
BARBARA	0.00	4.67	5.67	4.00	0.00
BRENDA	0.00	4.60	6.18	3.80	0.00
MARIE	0.00	4.20	4.58	3.33	3.00
HT	3.22	2.43	5.82	2.60	0.00
EUNYOUNG	0.00	2.24	2.83	1.79	0.60
RUTH	1.00	1.39	1.34	1.57	0.50
CAROLYN SUE	1.00	1.49	0.88	0.67	0.00
JEANNE	0.00	1.67	2.54	1.53	0.00

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Figure 5

CUMMULATIVE SUMMARY OF AVERAGE CATEGORY ATTAINMENT
IN TOPICS TAUGHT BY EACH TEACHER

UP TO END OF WEEK 12 OF TERM 2 73/74

********** CUMMULATIVE TOPIC AVERAGES **********

NAME OF TEACHER	SOCI	CLAS	SEBI	NUMB	PHYS
VICKIE	0.00	8.00	8.00	5.00	4.00
BARBARA	0.00	7.00	8.00	4.00	0.00
BRENDA	0.00	8.00	8.00	5.00	0.00
MARIE	0.00	8.00	3.00	3.00	3.00
MT	4.00	3.50	6.33	3.00	3.00
EUNYOUNG	5.54	3.53	3.12	1.54	4.01
RUTH	3.26	2.27	5.23	2.97	4.15
CAROLYN SUE	3.75	4.70	5.00	2.98	4.58
JEANNE	0.00	5.36	5.27	2.62	5.14

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Figure 6

CUMMULATIVE SUMMARY OF NUMBER OF LESSONS
IN TOPICS TAUGHT BY EACH TEACHER

UP TO END OF WEEK 12 OF TERM 2 73/74

********** CUMULATIVE NUMBER OF LESSONS **********

NAME OF TEACHER	SOCI	CLAS	SERI	NUMB	PHYS
VICKIE	0	5	5	4	1
BARBARA	0	3	3	1	0
BRENDA	0	6	6	4	0
BABIE	0	7	7	3	1
HT	3	16	17	16	1
EUNYOUNG	0	5	4	4	0
RUTH	0	2	1	3	0
CAROLYN SUE	0	2	0	0	0
JEANNE	0	1	3	3	0

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